

WHAT IS CLAIMED IS:

1. A heavy-metal oxyfluoride glass adapted for high energy laser applications, consisting essentially of

- (i) 1-25 mol% AlF₃,
- (ii) 20-65 mol% in total of RF₂,
- (iii) 1-20 mol% in total of R'F,
- (iv) 0.1-12 mol% in total of M(PO₃)_x,
- (v) 0.1-12 mol% in total of at least one oxide of ZrO₂, TiO₂, GeO₂, Al₂O₃, Ga₂O₃, SiO₂, Ta₂O₃ and HfO₂, wherein part of said 0.1-5% oxide is optionally replaceable by at least one of HfF₄, GaF₃ and ZrF₄, and

and incidental or unavoidable impurities in amounts insufficient to adversely affect the basic character of said glass,

wherein R is at least one of Mg, Ca, Sr, and Ba; R' is at least one of Li, Na, K and Cs; M is at least one of Ba, Mg, Na, Li, Al and K; x is 3 for M of valence 3, x is 2 for M of valence 2, and x is 1 for M of valence 1;

said heavy-metal oxyfluoride glass being capable of being quenched from a molten state to room temperature at a rate of 4.0°C/min without apparent crystallization.

2. The heavy-metal oxyfluoride glass of claim 1 wherein said oxide, optionally replaced in part by at least

one of HfF₄, ZrF₄ and GaF₃, is present in an amount of at least 0.2 mol%.

3. The heavy-metal oxyfluoride glass of claim 1 wherein said oxide, optionally replaced in part by at least one of HfF₄, ZrF₄ and GaF₃, is present in an amount of at least 0.5 mol%.

4. The heavy-metal oxyfluoride glass of claim 1 wherein said oxide, optionally replaced in part by at least one of HfF₄, ZrF₄ and GaF₃, is present in an amount no greater than 8 mol%.

5. The heavy-metal oxyfluoride glass of claim 1 wherein said oxide, optionally replaced in part by at least one of HfF₄, ZrF₄ and GaF₃, is present in an amount of no greater than 6 mol%.

6. The heavy metal oxyfluoride glass of claim 1 wherein at least one of said HfF₄ and ZrF₄ is present in an amount up to no greater than 80 mol% of said component (v).

7. The heavy metal oxyfluoride glass of claim 1 wherein at least one of said HfF₄ and ZrF₄ is present in an amount up to no greater than 45 mol% of said component (v).

8. The heavy metal oxyfluoride glass of claim 1 wherein said component (iv) is present in an amount no greater than 8 mol%.

9. The heavy metal oxyfluoride glass of claim 1 wherein said AlF₃ is present in an amount of 10-25 mol%, said component (ii) comprises 3-10 mol% MgF₂, 10-20 mol% CaF₂, 15-30 mol% SrF₂ and 10-20 mol% BaF₂, and component (iii) is present in an amount of 1-15 mol%.

10. The heavy metal oxyfluoride glass of claim 1, wherein component (ii) comprises a mixture of MgF₂, CaF₂, SrF₂, and BaF₂.

11. The heavy metal oxyfluoride glass of claim 1, wherein said heavy metal oxyfluoride glass is capable of being quenched from a molten state to room temperature at a rate of 2.5°C/min without apparent crystallization.

12. A window formed of the glass of claim 1, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

13. A window formed of the glass of claim 2, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

14. A window formed of the glass of claim 3, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

15. A window formed of the glass of claim 4, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

16. A window formed of the glass of claim 5, said window being substantially free of crystals, having low

absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

17. A window formed of the glass of claim 6, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

18. A window formed of the glass of claim 7, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

19. A window formed of the glass of claim 8, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially

free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

20. A window formed of the glass of claim 9, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

21. The window of claim 12 having a size greater than 3 inches in diameter and/or one-half inch in thickness.

22. The window of claim 21 having a diameter greater than four inches.

23. A window formed of the glass of claim 10, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

24. A window formed of the glass of claim 11, said window being substantially free of crystals, having low absorption at the operational wavelengths, having good chemical durability and thermal stability, being substantially free of striations and index inhomogeneity, and providing minimal wavefront distortion of a laser beam being transmitted through said window.

25. The heavy-metal oxyfluoride glass of claim 1 further comprising a rare-earth metal, wherein said rare-earth metal is present in an amount of up to 8 mol% of said oxyfluoride glass.

26. A laser-transmittable rod or fiber formed of the glass of claim 25.